CONFIDENTIAL(B)

SPECIFICATION

OF

LIQUID CRYSTAL DISPLAY MODULE

UNITED RADIANT TECHNOLOGY CORP. 光聯科技 Feb-14-2025 品管部 QC DEPT.

CUSTOMER : URT-STD

Model No. : UMOH-9861JD-T

Model version : 0

Document Revision : 0

Preliminary

CUSTOMER APPROVED SIGNATURE			

This specification need to be signed by purchaser or customer as a specification of products production and delivery from URT. Without signature of this specification , any purchase order for this model no. will be treated and considered that this specification is automatically acknowledged and accepted by purchaser or customer.

U.R.T. UNITED RADIANT TECHNOLOGY CORPORATION

Joe Wu	Ashin Chiu	Jenny Wang	Feb-14-2025
APPROVED	CHECKED	PREPARED	Date

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Revision record

Document Revision	Model No. Version No.	Description	Revision by
0	UMOH-9861JD-T Version No. 0	3.5" TFT.	Eason Cheng Eric Wang 14-Feb-2025

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1. BASIC SPECIFICATION

1.1 Mechanical specifications

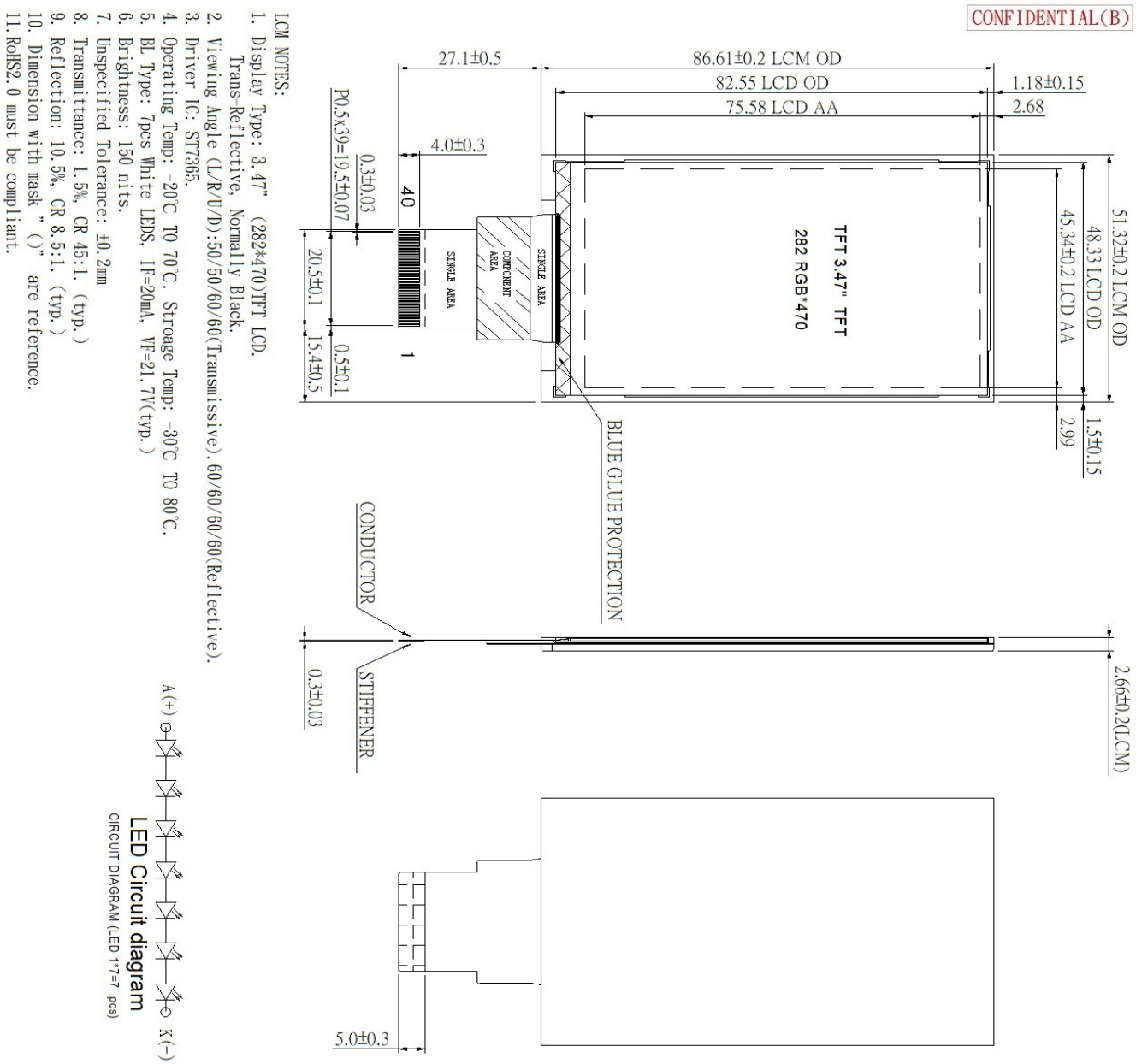
Items	Nominal Dimension	Unit
Active screen size	3.5” Diagonal	-
Dot Matrix	282 x RGB x 470	Pixel
Module Size (W×H×T)	51.32 x 86.61 x 2.66	mm.
Active Area (W×H)	45.34 x 75.58	mm.
Pixel Pitch (W×H)	0.160 x 0.160	mm.
Color depth	65K	-
Interface	MCU 8/16-bits/SPI	-
Driving IC Package	COG	-
Driving IC	COG	-
Module weight	TBD±10%	g

1.2 Display specification

Items	Descriptions	Note
LCD Type	a-Si TFT	-
LCD Mode	Normally Black	-
Polarizer Mode	Transflective Type	-
Pixel arrangement	RGB-stripe	-
Gray Scale Inversion Direction	ALL	-
Back Light	White LEDS	-

*Color tone is slightly changed by temperature and driving voltage.

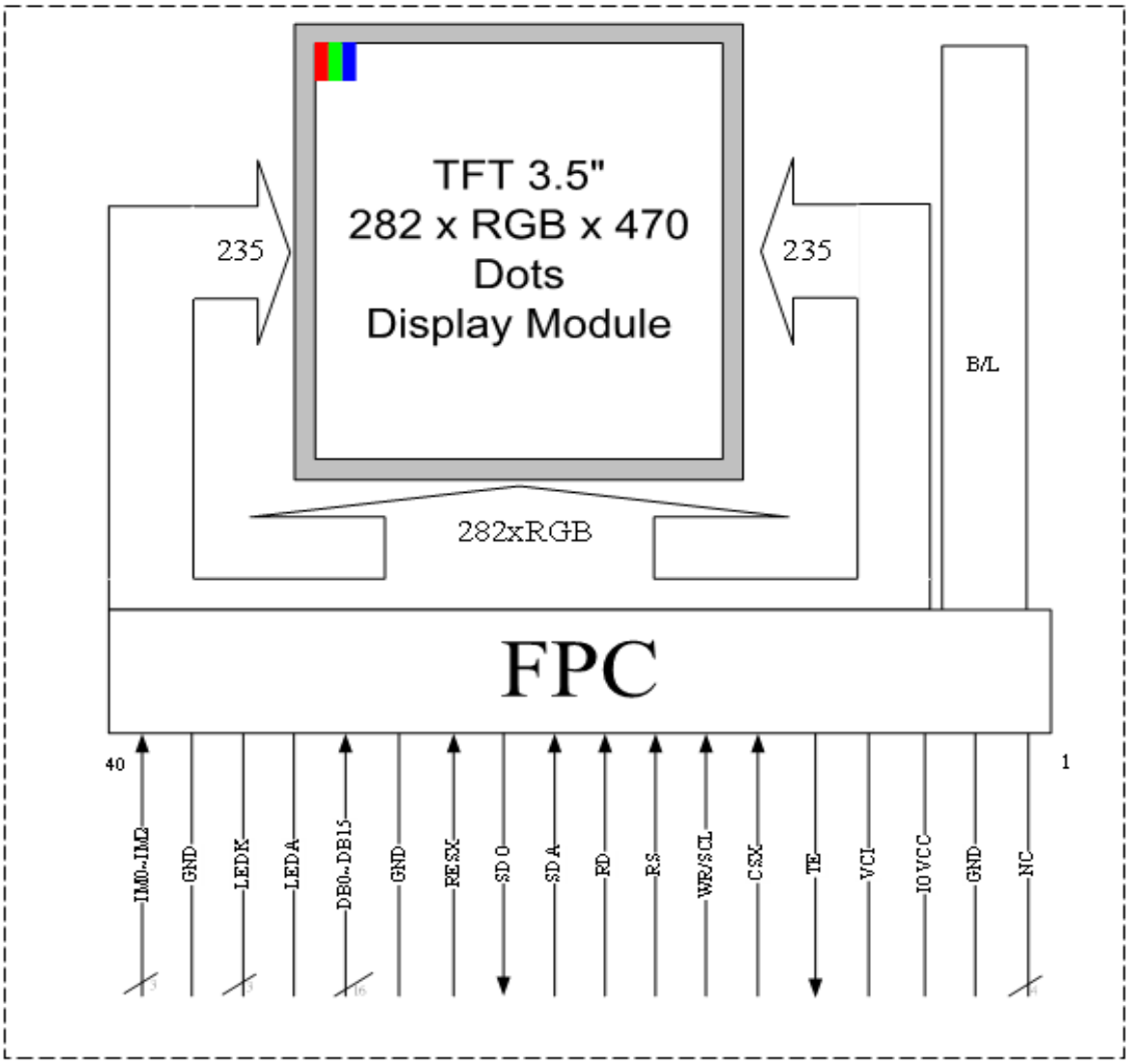
1.3 Outline dimension



LCM NOTES:

1. Display Type: 3.47" (282*470)TFT LCD.
   Trans-Reflective, Normally Black.
2. Viewing Angle (L/R/U/D):50/50/60/60(Transmissive).60/60/60/60(Reflective).
3. Driver IC: ST7365.
4. Operating Temp: -20℃ TO 70℃. Stroage Temp: -30℃ TO 80℃.
5. BL Type: 7pcs White LEDS, IF=20mA, VF=21.7V(typ.)
6. Brightness: 150 nits.
7. Unspecified Tolerance: ±0.2mm
8. Transmittance: 1.5%, CR 45:1. (typ.)
9. Reflection: 10.5%, CR 8.5:1. (typ.)
10. Dimension with mask "()" are reference.
11. RoHS2.0 must be compliant.

1.4 Block diagram:



1.5 Interface Pin :LCM

<table>
<tr><th>Pin No.</th><th>Pin Symbol</th><th>I/O</th><th>Description</th></tr>
<tr><td>1-4</td><td>NC</td><td>-</td><td>No Connector</td></tr>
<tr><td>5</td><td>GND</td><td>P</td><td>System Ground.</td></tr>
<tr><td>6</td><td>IOVCC</td><td>P</td><td>Power supply to interface pins</td></tr>
<tr><td>7</td><td>VCI</td><td>P</td><td>Power supply to power supply analog circuit.</td></tr>
<tr><td>8</td><td>TE</td><td>O</td><td>Tearing effect output pin</td></tr>
<tr><td>9</td><td>CSX</td><td>I</td><td>Chip select input pin (“Low” enable).</td></tr>
<tr><td>10</td><td>WRX/SCL</td><td>I</td><td>Write control pin for the DBI interface.
When the DBI type C is selected, this pin is used as serial clock pin.</td></tr>
<tr><td>11</td><td>RS</td><td>I</td><td>Display data / Command selection pin
D/CX=’1’: Display data. D/CX=’0’: Command data.
If not used, please fix this pin at GND level.</td></tr>
<tr><td>12</td><td>RD</td><td>I</td><td>Read control pin for the DBI interface.
If not used, please connect this pin to IOVCC.</td></tr>
<tr><td>13</td><td>SDA</td><td>I</td><td>Serial data input pin</td></tr>
<tr><td>14</td><td>SDO</td><td>O</td><td>Serial data Output pin</td></tr>
<tr><td>15</td><td>RESX</td><td>I</td><td>System Reset.</td></tr>
<tr><td>16</td><td>GND</td><td>P</td><td>System Ground.</td></tr>
<tr><td>17-32</td><td>DB0~DB15</td><td>I</td><td>Data bus.</td></tr>
<tr><td>33</td><td>LEDA</td><td>P</td><td>Anode input for LED backlight.</td></tr>
<tr><td>34-36</td><td>LEDK</td><td>P</td><td>Cathode input for LED backlight.</td></tr>
<tr><td>37</td><td>GND</td><td>P</td><td>System Ground.</td></tr>
<tr><td>38</td><td>IM0</td><td>I</td><td rowspan="3">-The MCU interface mode select.
<table><tr><th>IM2</th><th>IM1</th><th>IM0</th><th>MPU Interface Mode</th><th>Data pin</th></tr><tr><td>0</td><td>0</td><td>0</td><td>8080 18-bit Interface</td><td>DB[17:0]</td></tr><tr><td>0</td><td>0</td><td>1</td><td>8080 9-bit Interface</td><td>DB[8:0]</td></tr><tr><td>0</td><td>1</td><td>0</td><td>8080 16-bit Interface</td><td>DB[15:0]</td></tr><tr><td>0</td><td>1</td><td>1</td><td>8080 8-bit Interface</td><td>DB[7:0],</td></tr><tr><td>1</td><td>0</td><td>0</td><td>Reserve</td><td>--</td></tr><tr><td>1</td><td>0</td><td>1</td><td>3SPI</td><td>SDA, SDO</td></tr><tr><td>1</td><td>1</td><td>0</td><td>MIPI</td><td>MIPI_DATA
MIPI_CLOCK</td></tr><tr><td>1</td><td>1</td><td>1</td><td>4Line SPI</td><td>SDA, SDO</td></tr></table></td></tr>
<tr><td>39</td><td>IM0</td><td>I</td></tr>
<tr><td>40</td><td>IM1</td><td>I</td></tr>
</table>

2. ELECTRICAL CHARACTERISTICS

2.1 Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit
Analog Operation Voltage	VCI	-0.3	+4.6	V
I/O pin Operation Voltage	IOVCC	-0.3	+4.6	V
Operating temperature range	T_{OP}	-20	+70	℃
Storage temperature range	T_{ST}	-30	+80	℃

2.2 DC Characteristics

Item.	Symbol	Mini	Typ.	Max.	Unit	Condition
Analog Operation Voltage	VDD	2.5	2.8	3.3	V	-
I/O pin Operation Voltage	VDDI	1.65	1.8	3.3	V	-
Input high level voltage	V_{IH}	0.7VDDI	-	VDDI	V	-
Input low level voltage	V_{IL}	GND	-	0.3 VDDI	V	-
Output high level voltage	V_{OH}	0.8 VDDI	-	VDDI	V	-
Output low level voltage	V_{OL}	GND	-	0.2 VDDI	V	-
Power supply current	$I_{DD}+I_{DDI}$	-	-	TBD	mA	

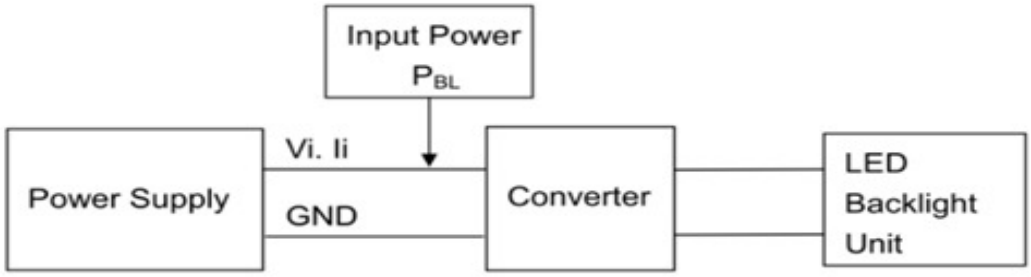
Measuring Condition :
Standard Value MAX.
Ta = 25°C
VCI=IOVCC = 2.8V
Display Patten = Checkered pattern

2.3 Back-light only Specification :

PARAMETER	SYMBOL	MIN	TYP	MAX	Unit	NOTE
Supply Current	If	-	20	-	mA	
Supply Voltage	Vf	20.3	21	21.7	V	1
Life Time	Lf	-	30000	-	Hr	2

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and If = 20 mA.

Note 2: LED current is measured by utilizing a high frequency current meter as shown below:



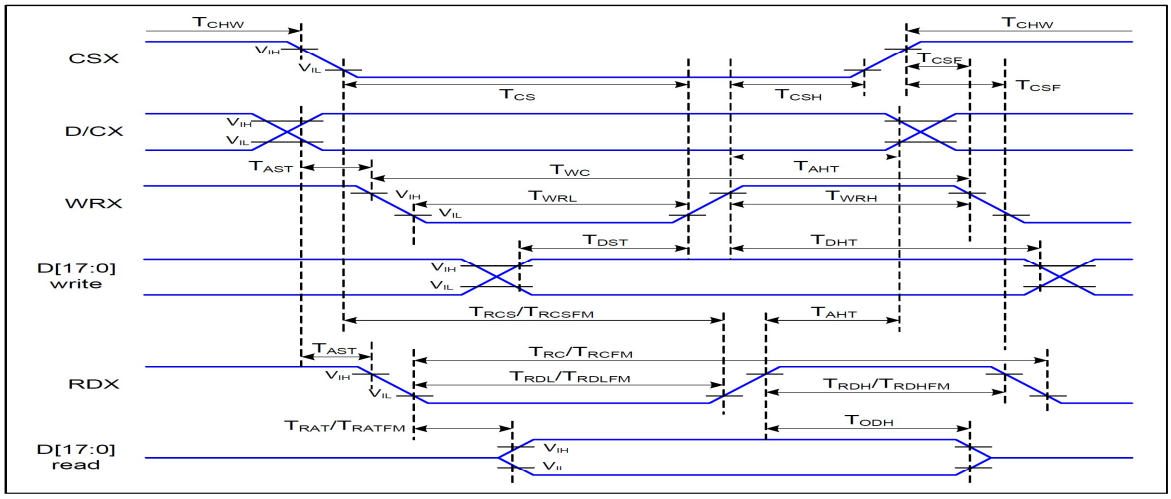
Note 3: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and If = 20mA.. The LED lifetime could be decreased if operating If is larger than 20 mA.

Note 4: LED light bar circuit:

2.4 AC Characteristics :

2.4.1 MCU Interface Timing.

8080 Series MCU Parallel Interface Characteristics: 18/16/9/8-bit Bus

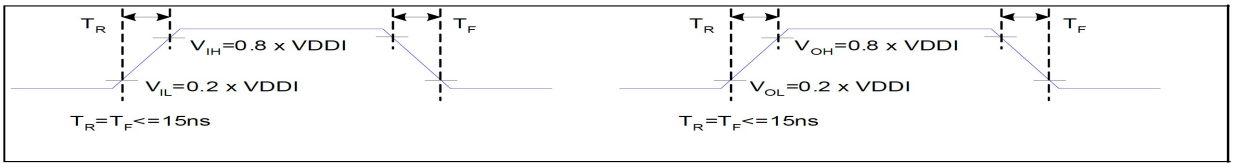


Parallel Interface Timing Characteristics (8080-Series MCU Interface)

VDDI=1.8V,VDDA=2.8V, AGND=DGND=0V, Ta=25℃

Signal	Symbol	Parameter	Min	Max	Unit	Description
D/CX	TAST	Address setup time	0		ns	-
	TAHT	Address hold time (Write/Read)	10		ns	
CSX	TCHW	Chip select "H" pulse width	0		ns	-
	TCS	Chip select setup time (Write)	15		ns	
	TRCS	Chip select setup time (Read ID)	45		ns	
	TRCSFM	Chip select setup time (Read FM)	355		ns	
	TCSF	Chip select wait time (Write/Read)	10		ns	
	TCSH	Chip select hold time	10		ns	
WRX	TWC	Write cycle	66		ns	
	TWRH	Control pulse "H" duration	15		ns	
	TWRL	Control pulse "L" duration	15		ns	
RDX (ID)	TRC	Read cycle (ID)	160		ns	When read ID data
	TRDH	Control pulse "H" duration (ID)	90		ns	
	TRDL	Control pulse "L" duration (ID)	45		ns	
RDX (FM)	TRCFM	Read cycle (FM)	450		ns	When read from frame memory
	TRDHFM	Control pulse "H" duration (FM)	90		ns	
	TRDLFM	Control pulse "L" duration (FM)	355		ns	
D[17:0]	I DST	Data setup time	10		ns	For CL=30pF
	TDHT	Data hold time	10		ns	
	TRAT	Read access time (ID)	-	40	ns	
	TRATFM	Read access time (FM)	-	340	ns	
	TODH	Output disable time	20	80	ns	

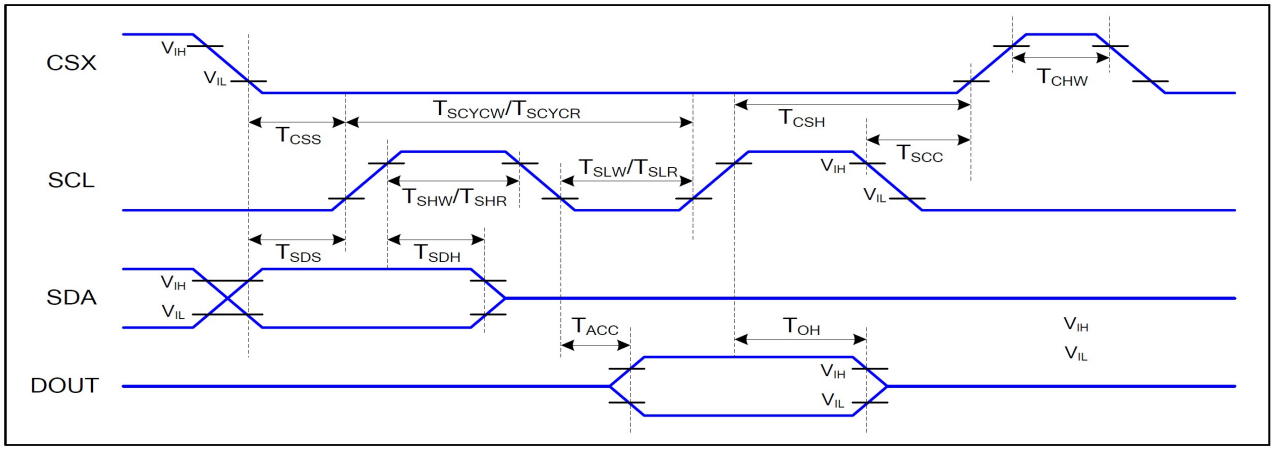
8080 Parallel Interface Characteristics



Rising and Falling Timing for I/O Signal

Note: The rising time and falling time (Tr, Tf) of input signal and fall time are specified at 15 ns or less. Logic high and low levels are specified as 20% and 80% of VDDI for Input signals.

2.4.2 SPI Interface Characteristics



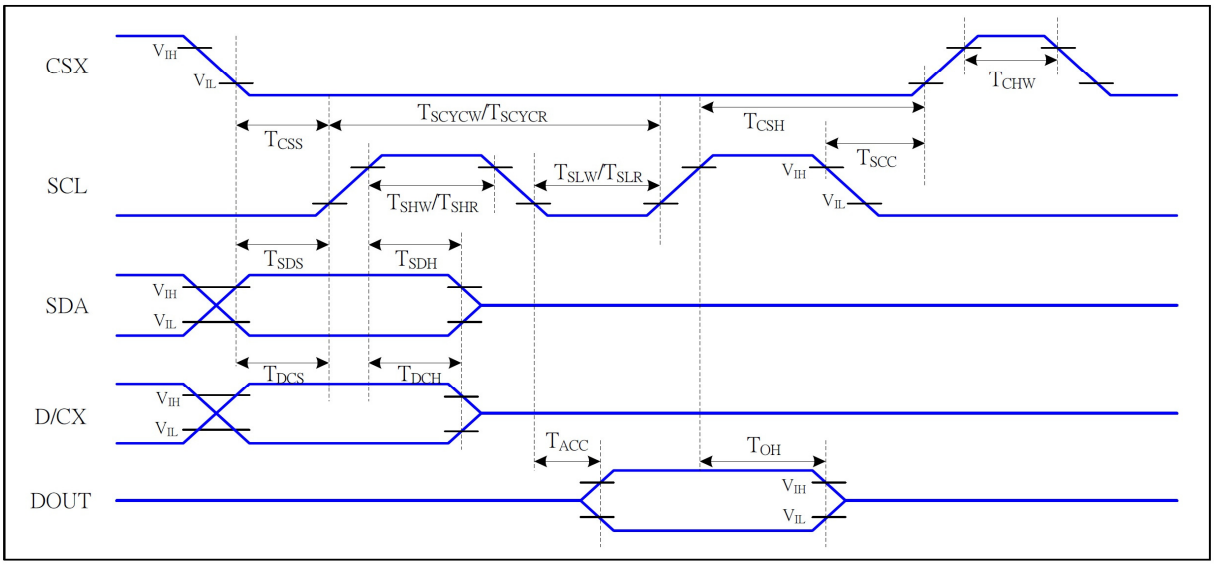
3-SPI Interface Timing Characteristics

VDDI=1.8V,VDDA=2.8V, AGND=DGND=0V, Ta=25 ℃

Signal	Symbol	Parameter	Min	Max	Unit	Description
CSX	T_{CSS}	Chip select setup time (write)	15		ns	
	T_{CSH}	Chip select hold time (write)	15		ns	
	T_{CSS}	Chip select setup time (read)	60		ns	
	T_{SCC}	Chip select hold time (read)	65		ns	
	T_{CHW}	Chip select “H” pulse width	40		ns	
SCL	T_{SCYCW}	Serial clock cycle (Write)	66		ns	
	T_{SHW}	SCL “H” pulse width (Write)	15		ns	
	T_{SLW}	SCL “L” pulse width (Write)	15		ns	
	T_{SCYCR}	Serial clock cycle (Read)	150		ns	
	T_{SHR}	SCL “H” pulse width (Read)	60		ns	
	T_{SLR}	SCL “L” pulse width (Read)	60		ns	
SDA (DIN)	T_{SDS}	Data setup time	10		ns	
	T_{SDH}	Data hold time	10		ns	
DOUT	T_{ACC}	Access time	10	50	ns	For maximum CL=30pF
	T_{OH}	Output disable time	15	50	ns	For minimum CL=8pF

3-SPI Interface Characteristics

4-SPI Serial Data Transfer Interface Characteristics:

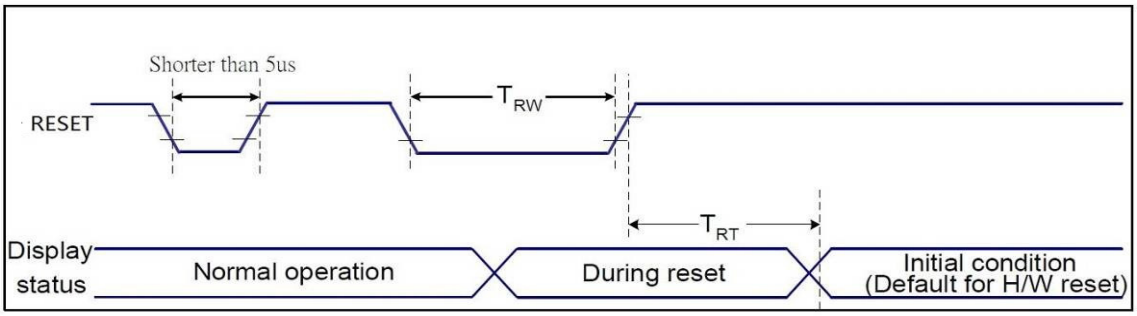


4-SPI Interface Timing Characteristics

VDDI=1.8V,VDDA=2.8V, AGND=DGND=0V, Ta=25 ℃

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
CSX	T_{CSS}	Chip select setup time (write)	15		ns	
	T_{CSH}	Chip select hold time (write)	15		ns	
	T_{CSS}	Chip select setup time (read)	60		ns	
	T_{SCC}	Chip select hold time (read)	65		ns	
	T_{CHW}	Chip select “H” pulse width	40		ns	
SCL	T_{SCYCW}	Serial clock cycle (Write)	66		ns	-write command & data ram
	T_{SHW}	SCL “H” pulse width (Write)	15		ns	
	T_{SLW}	SCL “L” pulse width (Write)	15		ns	
	T_{SCYCR}	Serial clock cycle (Read)	150		ns	-read command & data ram
	T_{SHR}	SCL “H” pulse width (Read)	60		ns	
	T_{SLR}	SCL “L” pulse width (Read)	60		ns	
D/CX	T_{DCS}	D/CX setup time	10		ns	
	T_{DCH}	D/CX hold time	10		ns	
SDA (DIN)	T_{SDS}	Data setup time	10		ns	
	T_{SDH}	Data hold time	10		ns	
DOUT	T_{ACC}	Access time	10	50	ns	For maximum CL=30pF
	T_{OH}	Output disable time	15	50	ns	For minimum CL=8pF

2.5 Reset Timing



Reset Timing

IOVCC=1.65 to 3.3V, VCI=2.4 to 3.3V, GND=0V, Ta=25℃

Related Pins	Symbol	Parameter	MIN	MAX	Unit
RESET	TRW	Reset pulse duration	10	-	us
	TRT	Reset cancel	-	5 (Note 1, 5)	ms
				120 (Note 1, 6, 7)	ms

Reset Timing

Notes:

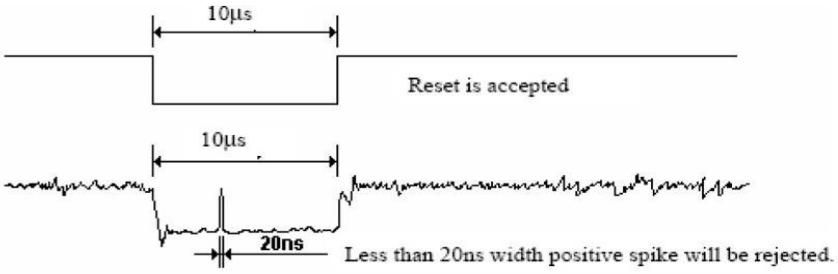
1. The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NVM (or similar device) to registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESET.

2. Spike due to an electrostatic discharge on RESET line does not cause irregular system reset according to the table below:

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 9us	Reset
Between 5us and 9us	Reset starts

3. During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode.) and then return to Default condition for Hardware Reset.

4. Spike Rejection also applies during a valid reset pulse as shown below:



5. When Reset applied during Sleep In Mode.

6. When Reset applied during Sleep Out Mode.

7. It is necessary to wait 5msec after releasing RESET before sending commands. Also Sleep Out command cannot be sent for 120msec.

2.6 Power ON/OFF Sequence

Power ON/OFF Sequence

VDDI and VDD can be applied in any order.

VDD and VDDI can be power down in any order.

During power off, if LCD is in the Sleep Out mode, VDD and VDDI must be powered down minimum 120msec after RESX has been released.

During power off, if LCD is in the Sleep In mode, VDDI or VDD can be powered down minimum 0msec after RESX has been released.

CSX can be applied at any timing or can be permanently grounded. RESX has priority over CSX.

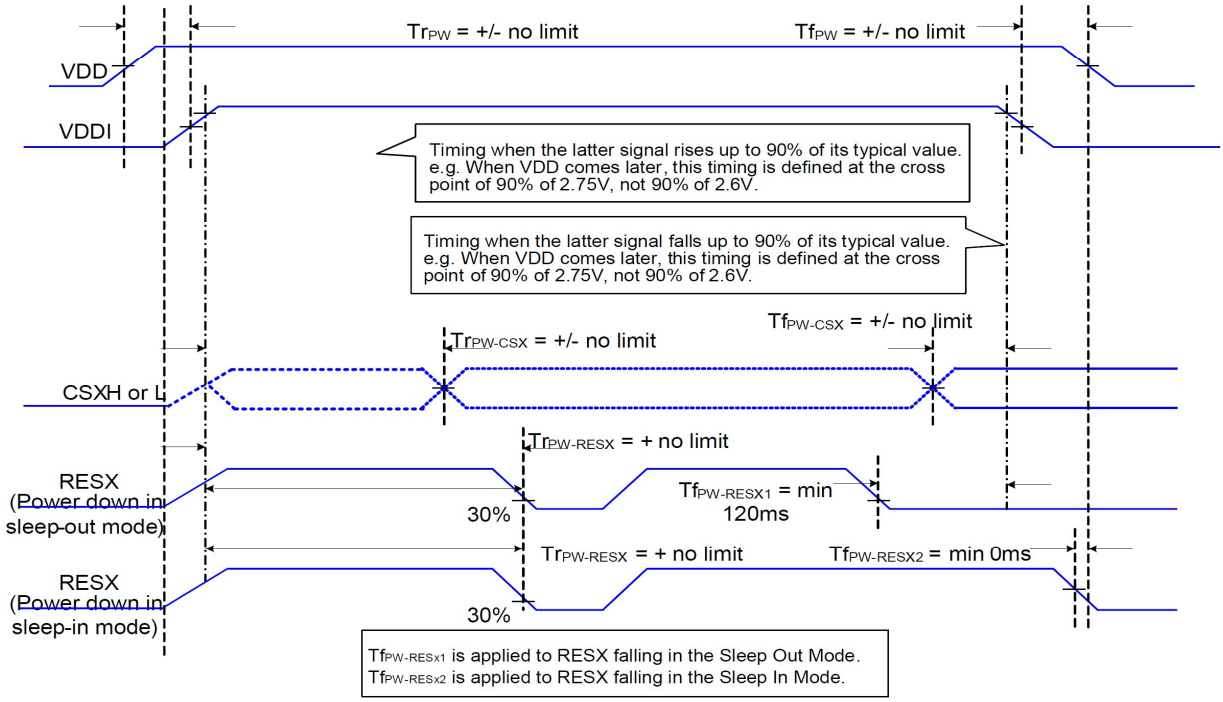
Note 1: There will be no damage to the display module if the power sequences are not met.

Note 2: There will be no abnormal visible effects on the display panel during the Power On/Off Sequences.

Note 3: There will be no abnormal visible effects on the display between end of Power On Sequence and before receiving Sleep Out command. Also between receiving Sleep In command and Power Off Sequence.

Note 4: If RESX line is not held stable by host during Power On Sequence as defined in the sequence below, then it will be necessary to apply a Hardware Reset (RESX) after Host Power On Sequence is complete to ensure correct operation. Otherwise function is not guaranteed.

The power on/off sequence is illustrated below (320RGB x 480)



3. OPTICAL CHARACTERISTICS

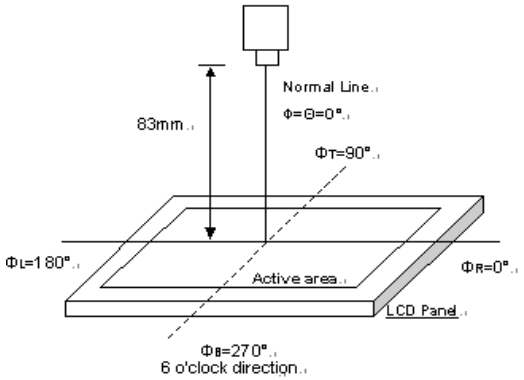
3.1 Characteristics

Electrical and Optical Characteristics

No.	Item			symbol / temp.		Min.	Typ.	Max.	Unit	Note
1	Response Time			Tr+Tf	θ =Φ=0°	-	-	30	ms	2
2	Viewing Angle (Transmissive)	Hor.	Cr≥ 10	θ_{2+}	Φ= 0°	-	50	-	degree	3
				θ_{2-}	Φ=180°	-	50	-		
		Ver.		θ_{1+}	Φ=270°	-	60	-		
				θ_{1-}	Φ=90°	-	60	-		
	Viewing Angle (Reflective)	Hor.	Cr≥ 10	θ_{2+}	Φ= 0°	-	60	-		
				θ_{2-}	Φ=180°	-	60	-		
		Ver.		θ_{1+}	Φ=270°	-	60	-		
				θ_{1-}	Φ=90°	-	60	-		
3	Contrast Ratio			Cr	25 ℃	-	TBD	-	-	4
4	Red x-code			Rx	25 ℃	-	TBD	-	-	5
	Red y-code			Ry		-	TBD	-		
	Green x-code			Gx		-	TBD	-		
	Green y-code			Gy		-	TBD	-		
	Blue x-code			Bx		-	TBD	-		
	Blue y-code			By		-	TBD	-		
	White x-code			Wx		-	TBD	-		
	White y-code			Wy		-	TBD	-		
	Brightness			Y		-	125	150	cd/m^2	
5	Brightness Uniformity			U	25 ℃	-	TBD	-	%	6

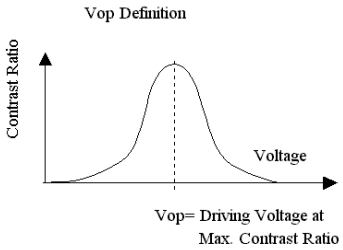
3.2 Definition of optical characteristics

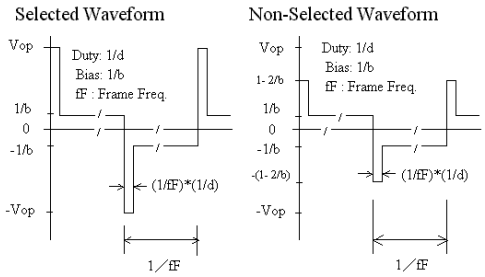
Measurement condition : Transmissive mode optical measurement system



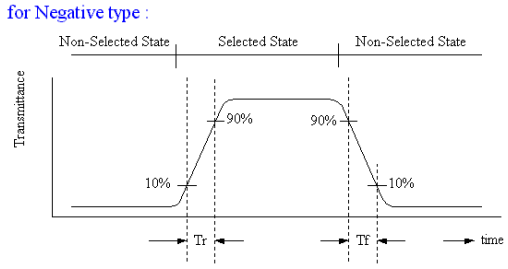
LCD Evaluation System : DMS-803
Light Source : Halogen Lamp.

[Note 1] Definition of LCD Driving Vop and Waveform :

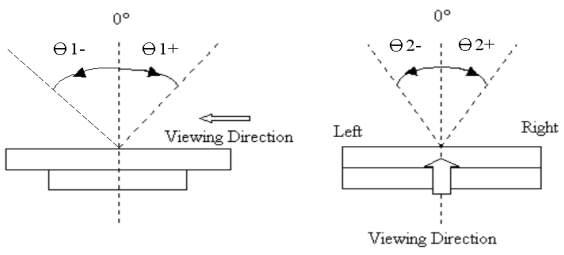




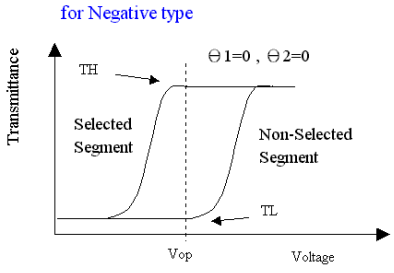
[Note 2] Definition of Response Time



[Note 3] Definition of Viewing Angle :

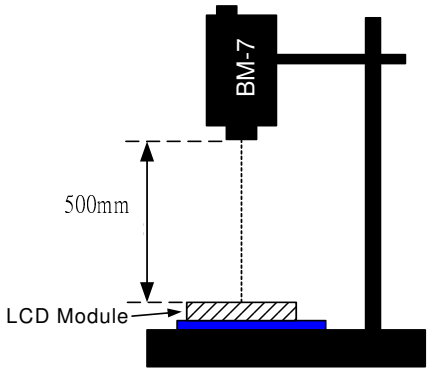


[Note 4] Definition of Contrast Ratio :

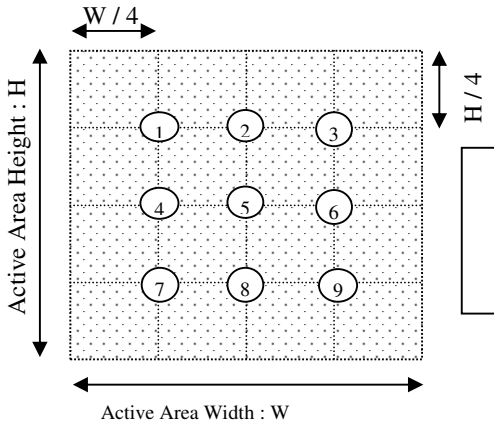


$$\text{Contrast Ratio} = \frac{TH}{TL}$$

[Note 5] Definition of measurement of Color Chromaticity and Brightness



[Note 6] Definition of Brightness Uniformity



$$\text{Brightness Uniformity} = \frac{\text{Minimum Brightness of Point 1~9}}{\text{Maximum Brightness of Point 1~9}}$$

4. RELIABILITY :

Item No	Items	Condition		Note
1	High temperature operating	70 ℃ , 240 hours		IEC60068-2-2
2	Low temperature operating	-20 ℃ , 96 hours		IEC60068-2-1
3	High temperature storage	80 ℃ , 240 hours		IEC60068-2-2
4	Low temperature storage	-30 ℃ , 240 hours		IEC60068-2-1
5	High temperature & humidity	60℃, 90%RH, 240 hours		IEC60068-2-78
6	Thermal Shock storage	-30℃, 30min.<=> 80℃, 30min. as 1Cycle，Total : 10 Cycles.		IEC60068-2-14
7	Vibration test	Frequency: 10 Hz ~55 Hz~ 10Hz, Amplitude : 1.5mm. X,Y,Z direction for total 3 hours (Packing Condition)		IEC60068-2-6
8	Drop test	Packed, 60 cm free fall, 6 sides, 1 corner, 3edges (Packing Condition)		IEC60068-2-32
9	ESD Test	Air Discharge: Apply 2 KV with 5 times Discharge for each polarity +/-	Contact Discharge: Apply 250 V with 5 times discharge for each polarity +/-	IEC60068-2-6
		1. Temperature ambiance : 15℃～35℃ 2. Humidity relative : 30%～60% 3. Energy Storage Capacitance(Cs+Cd) : 150pF±10% 4. Discharge Resistance(Rd) : 330Ω±10% 5. Discharge, mode of operation : Single Discharge (time between successive discharges at least 1 sec)		

5. PRODUCT HANDLING AND APPLICATION

5.1 PRECAUTION FOR HANDLING LCM

- The LCD module contains a C-MOS LSI. People who operate the LCM should wear ESD protection eguipement to prevent ESD hurt on products.
- Do not input any signal before power is turned on.
- Do not take LCM from its packaging bag until it is assembled.
- Peel off the LCM protective film slowly since static electricity may be generated.
- Hand Soldering : Soldering temperature less than 260℃,within 5 sec, at 5 mm. Away from pin connection.
- Do not touch the display surface or connection terminals area with bare hands.Smudges on the display surface reduce the insulation between terminals.
- Do not twist or bend the modules and also avoid any inappropriate external force on display surface during assembly.
- Do not expose LCM to organic solvent. IF clean the surface , wipe it gently with soft cloth dampened by alcohol.
- Do not attempt to wiped off the contact pads.
- Keep LCM panels away from direct sunlight or fluorescent light, , also avoid them in high-temperature & high humidity environment for a long period.
- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life.
- Do not drive LCM by DC voltage & avoid displaying at certain pattern for a long time otherwise it might cause image sticking.
- Response time will be extremely delayed at lower temperature then the operating temperature range and on the other hand at higher temperature LCD's how dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.
- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- Never use the LCD , LCM under 45 Hz , the liquid crystal will decomposition and cause permently damage on display !!
- Liquid in LCM is hazardous substance. In case a contact with liquid crystal material is occured, be sure to immediately wash such material away by soap and water.
- The polarizer is easily damaged and should be handle with special care. Don't press or rub it with hard objects.

5.2 PRECAUTION FOR STORING

- Store the module in a dark room where must keep at 25±10℃ and 65%RH or less.
- Do not store the module in surroundings containing organic solvent or corrosive gas
- Store the module in an anti-electrostatic container or bag.

5.3 USING ON MEDICAL CARE , SAFETY OR HAZARDOUS APPLICATION OR SYSTEM

- For the application in medical care, safety and hazardous prodcuts or systems, an authorization from URT is required. URT will not responsible for any damage or loss which caused by the products without any authorization given by URT.
- This product is not allowed to be designed and used for military application and/or purpose.
- The delivery of this product to the countries and/or regions where the embargoes are imposed by U.N. is prohibited.
- The application and delivery of this product must comply with Startegic High-Tech Commodities (SHTC) export control and the sales to the embargoed and/or sanctioned countries or regions are strictly prohibited.

6. DATE CODE OF PRODUCTS

- Date code will be shown on each product :

- **YY MM DD - XXXX**

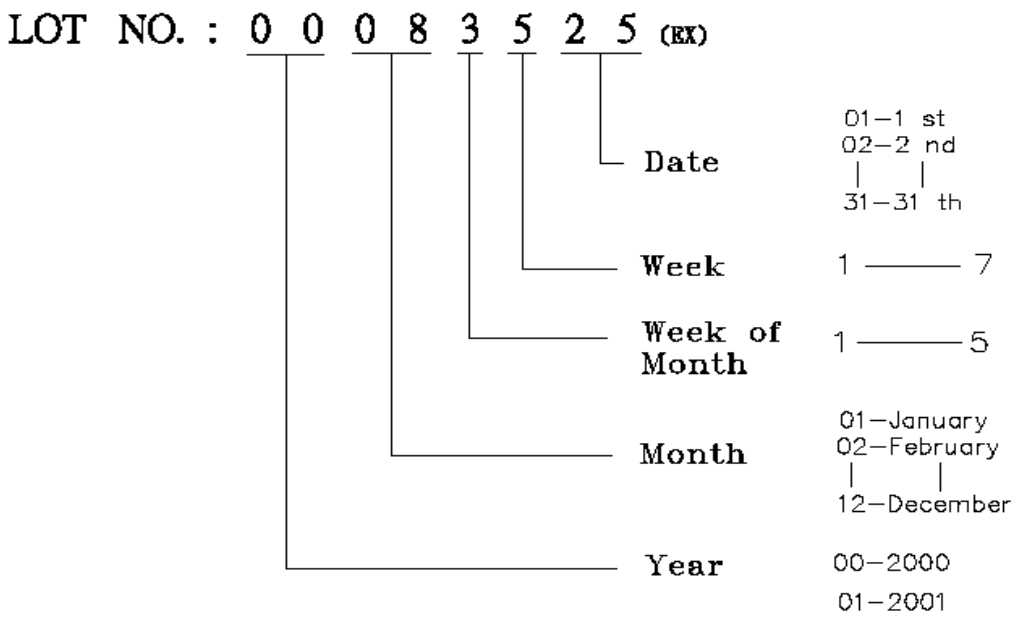
  Year Month Day - Production control number

- Example: 241108 - 0003 ==> Year 2024, November,8th ,
  Production control number no. 0003

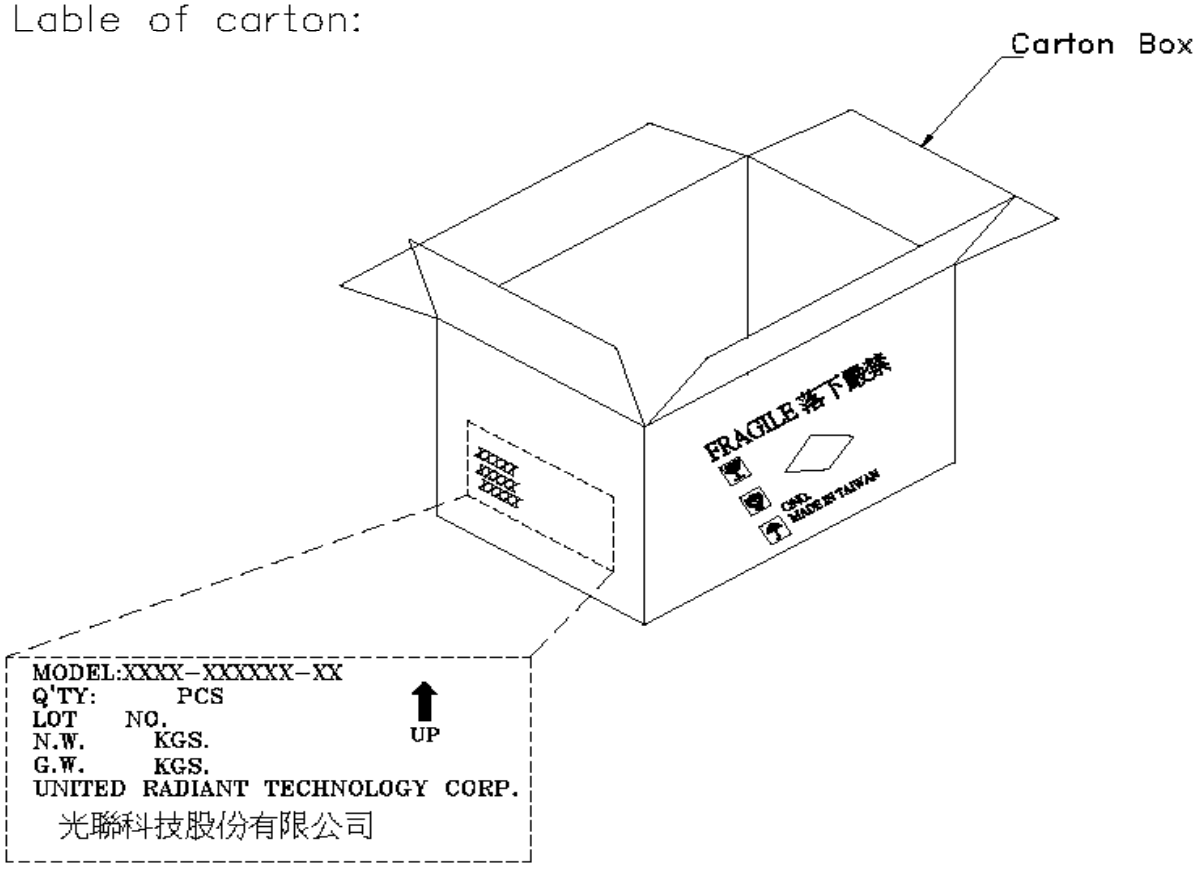
Note ： The lot no. attached on the packing box will be used for tracking once the part is too small to print the date code.

7. LOT NO.

Instruction of lot number:



Lable of carton:



8. Inspection Standard

8.1 Quality :

The quality of goods supplied to purchaser shall come up to the following standard.

8.1.1 The Method Of Preserving Goods

After delivery of goods fromU.R.T. to purchaser. Purchaser shall control the LCM at -10 ℃ to 40 ℃ and it might be desirable to keep at the normal room temperature and humidity until incoming inspection or throwing into process line.

8.1.2 Incoming Insection

(A) The method of inspection

If purchaser make an incoming inspection, a sampling plan shall be applied on the condition that quality of one delivery shall be regarded as one lot.

(B) The standard of quality

ISO-2859-1 (SAME AS MIL-STD-105E) , LEVEL Ⅱ SINGLE PLAN.

Definition	AQL(%)
MAJOR	0.65 %
MINOR	1.5 %

EVERY ITEM SHALL BE INSPECTED ACCORDING TO THE CLASS.

8.1.3 Warranty Policy

(A) U.R.T. will provied one-year warranty for the products only if under specification operating conditions. U.R.T. will replace good products for these defect products which under warranty period and belong to the responsibility of U.R.T.

(B) The warranty period starts from delivery date.

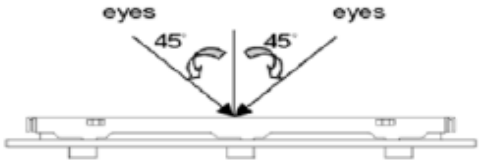
(C) Customer is responsible for proving delivery date when customer returns defective product which is out of warranty, otherwise, the warranty period will be based on date code.

8.1.4 Illustrate of The Inspection

Samples cannot be the inspection standard. The purpose of the sample is to assist and verify compliance with the specifications, not to be used as the inspection standard.

If samples or actual products are to be used as the inspection standard, both parties should sign an additional agreement "Inspection Sample or Limited Sample".

8.2 Checking Condition

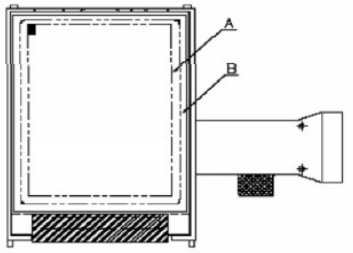


8.2.1. Viewing distance is approximately：30 ± 5 cm.

8.2.2. Viewing angle is normal to the LCD panel with 45°.

8.2.3. Ambient illuminance：2 pcs of 20W fluorescent lamps.

8.2.4. Definition of aera:



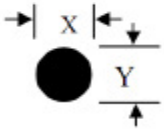
A area : viewing area

B area : Outside of viewing area

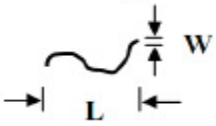
8.3. INSPECTION :

<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td rowspan="3">01</td><td rowspan="3">Product condition</td><td>1.1 The part number is inconsistent with work order of Production.</td><td>Major</td></tr>
<tr><td>1.2 Mixed product types.</td><td>Major</td></tr>
<tr><td>1.3 Assembled in inverse direction.</td><td>Major</td></tr>
<tr><td>02</td><td>Quantity</td><td>2.1 The quantity is inconsistent with work order of production.</td><td>Major</td></tr>
<tr><td>03</td><td>Outline dimension</td><td>3.1 Product dimension and structure must conform to structure diagram.</td><td>Major</td></tr>
<tr><td rowspan="5">04</td><td rowspan="5">Electrical Testing</td><td>4.1 Missing line character and icon.</td><td>Major</td></tr>
<tr><td>4.2 No function or no display.</td><td>Major</td></tr>
<tr><td>4.3 Display malfunction.</td><td>Major</td></tr>
<tr><td>4.4 LCD viewing angle defect.</td><td>Major</td></tr>
<tr><td>4.5 Current consumption exceeds product specifications.</td><td>Major</td></tr>
<tr><td>05</td><td>Dot defect
(Bright dot、Dark dot)
On-display</td><td>5.1 For Dark or bright dots on display , due to constant lit pixel , the acceptance criteria is per following table:
<table>
<tr><th></th><th>Bright Dot(white, Blue,Red & Green)</th><th>Dark Dot (Black)</th></tr>
<tr><td>Dot Size ≤ Ø0.2mm</td><td>Accept</td><td>Accept</td></tr>
<tr><td>Dot Size Ø0.2–Ø0.3mm</td><td>1</td><td>2(≥5mm apart)</td></tr>
<tr><td>Dot Size > Ø0.3mm</td><td>Unacceptable</td><td>Unacceptable</td></tr>
<tr><td>Max.Dot on single display</td><td>1</td><td>2(≥5mm apart)</td></tr>
</table>
5.2 The acceptance criteria for bright or dark dots on display due to stain , dust particles or other entrapments is as follow:
• Dot size ≤ 0.25mm
• Maximum 2 dots allow on one display
• The 2 dots must be ≥ 5mm apart
5.3 Example of bright dots on display:
 
</td><td>Major</td></tr>
</table>

<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td>06</td><td>Black or white
dot、scratch、
Contamination

Round type
 

Φ =(x+y) / 2

Line type
 
</td><td>6.1 Round type (Non-display) :
<table><tr><th rowspan="2">Dimension
(diameter :Φ)</th><th colspan="2">Acceptance (Q'ty)</th></tr><tr><th>A area</th><th>B area</th></tr><tr><td>Φ ≦ 0.15</td><td>Ignore</td><td rowspan="5">Ignore</td></tr><tr><td>0.15 < Φ ≦ 0.20</td><td>2</td></tr><tr><td>0.20 < Φ ≦ 0.30</td><td>2</td></tr><tr><td>Φ > 0.30</td><td>0</td></tr><tr><td>Total</td><td>3</td></tr></table>6.2 Visible scratch line, by light refraction, or due to connected dots (pixel) beyond any of the following criteria is considered unacceptable.

• Width (thickness) of the line ≤ 0.05mm
• Total Length ≤ 5.0mm
• Maximum 3 lines
• Distance between lines ≥ 5mm apart</td><td>Major</td></tr>
<tr><td>07</td><td>Polarizer
Bubble</td><td><table><tr><th rowspan="2">Dimension
(diameter :Φ)</th><th colspan="2">Acceptance (Q'ty)</th></tr><tr><th>A area</th><th>B area</th></tr><tr><td>Φ ≦ 0.20</td><td>Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>0.20 < Φ ≦ 0.50</td><td>3</td></tr><tr><td>Φ > 0.50</td><td>0</td></tr><tr><td>Total</td><td>3</td></tr></table></td><td>Major</td></tr>
</table>